REMARKS

Claims 1-48 were pending at the time of the Office action. None of the claims is amended. Claims 49 and 50 are newly added. No new matter is added. Accordingly, claims 1-50 are pending in the application.

Claim Rejection Under 35 U.S.C. 101

In paragraph 2 of the Office action, claim 37 was rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter.

The rejection of claim 37 under 35 U.S.C. 101 is respectfully traversed in that it is believed the claim 37 is directed to statutory subject matter.

Claim 37 recites features that are directed towards transforming underlying subject matter into a different state or thing (e.g., "modulating a level of a signal of each of the frequency bands based on the modulation level"). As explained by the Federal Circuit, "a claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing." (*In Re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008) (Emphasis added)). Because claim 37 recites, among other features, "modulating a level of a signal of each of the frequency bands based on the modulation level[,]" it recites features directed towards transforming a signal into a different state or thing.

Further, Applicant respectfully submits that the Federal Circuit has explained that a "transitory signal made of electrical or electromagnetic variances" is "physical and real[.]" (*In Re Nuijten*, 500 F.3d 1346, 1355 (Fed. Cir. 2007)). Because a "signal" has been deemed "physical and real," Applicants respectfully submit that a "signal" constitutes a "particular article" that is capable of being transformed into a different state or thing.

At least for the reasons explained, it is believed that claim 37 fully complies with the requirements of 35 U.S.C. 101.

Claim Rejections Under 35 U.S.C. 103

In paragraph 4 of the Office action, claims 1-48 were rejected under 35 U.S.C. 103(a) as being unpatentable over Choi ("Choi," U.S. Patent Application Publication No. 2003/0014246), in view of "Voice Morphing System for Impersonating in Karaoke Applications" by Cano et al. ("Cano") and in view of Gibson et al. ("Gibson," U.S. Patent No. 6,336,092).

The above rejections are respectfully traversed.

As previously presented, independent claim 1 recites a vocoder system comprising:

> formant detection means for analyzing a first musical tone signal to detect formant characteristics of the first musical tone signal;
>
> musical tone signal input means for inputting a second musical tone signal that corresponds to specified pitch information;
>
> division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed;
>
> setting means for setting modulation levels at the fixed center frequency of each of the frequency bands based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed; and
>
> modulation means for modulating a level of a signal of each of the frequency bands based on the modulation level set in the setting means. (Emphasis added.)

As discussed below, the Examiner's proposed combination of Choi, Cano and Gibson (which combination is respectfully traversed below) would not have met the claimed invention. This is because Gibson does not disclose or suggest setting means for setting modulation levels at the fixed center frequency of each of the frequency bands and, thus, would not have addressed acknowledged distinctions over Choi and Cano.

As an initial matter, the Examiner acknowledges that Choi does not disclose or suggest "musical tone signal input means for inputting a second musical tone signal that corresponds to specified pitch information[,]" as recited in claim 1.

However, the Examiner contends that Cano addresses the above features and further contends that it would have been obvious to modify Choi according to Cano "in order to extend voice changing to singing application, as described by Cano[.]" (Office Action, page 4.)

Applicant respectfully traverses the above contentions, in that it would not have been obvious to combine Choi and Cano in the manner proposed by the Examiner. It would not have been obvious to do so because, for example, there is no apparent reason to combine systems directed towards very different applications, respectively described in Choi and Cano.

Choi is directed to modulating a voice over a mobile communication terminal. (See Choi, paragraph [0002].) In contrast, Cano is directed to morphing a user's voice per a prerecorded voice of a target singer in a karaoke application. (See Cano, page 3.) More particularly, Cano discloses that functions that are unique to a karaoke application (i.e., phonetic recognition and alignment between the voices of the user and the target singer) are practically essential. (See Cano, page 3, which discloses: "This would be a rather impossible/impractical problem if it was not for the fact that we know the words beforehand, the lyrics of the song. This reduces a big portion of the search problem: all the possible paths are restricted to just one string of phenomes, with several possible pronunciations . . . Besides knowing the lyrics, music information is also available.)

At least because the nature of the applications respectfully disclosed in Choi and Cano and the issues presented therein are so different from each other, Applicant respectfully submit that there is no apparent reason to combine these references in the manner proposed.

The Examiner also acknowledges that Choi, in view of Cano, does not teach "division means for dividing the second musical tone signal into a plurality of frequency bands, the

respective center frequencies of which have been fixed[,]" "setting means for setting modulation levels at the fixed center frequency of each of the frequency bands based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed[,]" and "modulation means for modulating a level of a signal of each of the frequency bands based on the modulation level set in the setting means[,]" as recited in claim 1.

However, the Examiner contends that Gibson suggests the above features. Further, the Examiner contends that it would have been obvious to modify Choi, in view of Cano, according to the alleged suggestions of Gibson "in order to transform voices with reduced computation demands, as described by Gibson[.]" (Office Action, pages 5-6.)

Applicants respectfully traverse these contentions. As will be explained in more detail below, Gibson does not address distinctions between claim 1 and Choi, in view of Cano. Further, it would not have been obvious to combine Choi in view of Cano, with the alleged suggestions of Gibson in the manner proposed by the Examiner because these is no apparent reason to do so.

First, Applicants respectfully submit that Gibson does not address the following features of claim 1:

> division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed;
>
> setting means for setting modulation levels at the fixed center frequency of each of the frequency bands based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed; and
>
> modulation means for modulating a level of a signal of each of the frequency bands based on the modulation level set in the setting means. (Emphasis added.)

Rather, Gibson discloses modifying a spectral envelopes by apparently changing frequencies of spectral envelopes. In particular, Gibson discloses five methods of spectral modification for "scaling the spectral envelope [of a user's voice] to more closely match the timbre of the target vocal signal." (Gibson, col. 7, lines 22-29.) Applicant respectfully submits that none of these five methods discloses or suggests the above-noted features of claim 1.

Rather, each of these five methods involves changing frequencies of the envelopes. Indeed, Gibson discloses that, among these five methods, the third of these methods "requires the least amount of computation." (Gibson, col. 8, lines 15-17.) Gibson further discloses that this third method effectively involves shifting a spectral envelope in frequency by a certain percentage (e.g., 10 percent). (See Gibson, col. 8, lines 12-15.)

Regarding the five methods, Gibson discloses that the first method involves applying a conformal mapping to the transfer function of a digital filter. (See Gibson, col. 7, lines 30-50.) Because this first method involves modifying the transfer function of the filter in such a manner, it also involves changing the coefficients of the filter in order to change the frequencies of the spectral envelope. Therefore, Gibson's disclosure regarding the first method does not disclose or suggest the previously-noted features of claim 1.

Regarding the second method, Gibson discloses that this method involves finding singularities (i.e., poles and zeros) of a digital filter transfer function and then modifying the location of these singularities to generate a new digital filter having the desired spectral characteristics. (See Gibson, col. 7, lines 51-57.) Because this second method involves modifying locations of poles and zeros of one digital filter to generate another digital filter, it also involves generating new filter coefficients and changing the frequencies of the spectral envelope. Therefore, Gibson's disclosure regarding the second method does not disclose or suggest the previously-noted features of claim 1.

Regarding the third method – as previously explained, this method effectively involves shifting a spectral envelope in frequency by a certain percentage (e.g., 10 percent). (See Gibson,

col. 8, lines 12-15.) More particularly, this method involves modifying vocal signals temporally (i.e., in the time domain) in order to obtain a frequency-scaled spectral envelope. (See Gibson, col. 7, lines 59-67.) As such, Gibson's disclosure regarding the third method does not disclose or suggest the previously-noted features of claim 1.

Finally, the fourth and fifth methods described in Gibson also appear to involve changing frequencies of spectral envelopes. Regarding the fourth method, Gibson discloses manipulating a frequency-transformed representation of a signal, as described in a paper by Seneff. (See Gibson, col. 8, lines 18-23.) Applicant understands that this fourth method also involves changing frequencies of spectral envelopes.

Regarding the fifth method, Gibson discloses decomposing a digital filter transfer function into multiple lower-order sections and then modifying the lower-order sections using previously-described methods. (See Gibson, col. 8, lines 24-28.) Because the previously-described methods involved changing frequencies of spectral envelopes, this fifth method also involves changing frequencies of spectral envelopes.

At least for the reasons explained, Gibson does not disclose or suggest features of claim 1, including "division means for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been **fixed**[,]" "setting means for setting modulation levels at the **fixed** center frequency of each of the frequency bands based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed[,]" and "modulation means for modulating a level of a signal of each of the frequency bands based on the modulation level set in the setting means." (Emphasis added.)

Further, similar to Cano, Gibson is also directed towards a karaoke application, in which a recording of a target voice is necessary in a transformation process. (See Gibson, col. 1, lines 18-20.) For reasons similar to those previously explained regarding the proposed combination of

Choi and Cano, Applicant respectfully submits that there is no apparent reason to combine Choi, Cano and Gibson in the manner proposed by the Examiner.

At least for the reasons explained, claim 1 is patentable over the cited references.

Claims 2, 4, 5, 19-36, 41-43 and 45-48 depend from claim 1. At least for this reason, claims 2, 4, 5, 19-36, 41-43 and 45-48 are patentable over the cited references.

As previously presented, independent claim 37 recites:

> A method for generating a musical signal comprising:
>
> detecting formant characteristics of a first musical tone signal;
>
> inputting a second musical tone signal that corresponds to specified pitch information;
>
> dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed;
>
> setting modulation levels at the fixed center frequency of each of the frequency bands based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed; and
>
> modulating a level of a signal of each of the frequency bands based on the modulation level. (Emphasis added.)

At least for reasons similar to those presented with respect to independent claim 1, Applicant respectfully submits that independent claim 37 is patentable over the cited references.

As previously presented, independent claim 38 recites:

> A vocoder system comprising:
>
> a formant detector for detecting formant characteristics of a first musical tone signal;

an input device for inputting a second musical tone signal that corresponds to specified pitch information;

a divider connected to the input device for dividing the second musical tone signal into a plurality of frequency bands, the respective center frequencies of which have been fixed;

a level setter for setting modulation levels at the fixed center frequency of each of the frequency bands based on the formant characteristics and formant control information with which the formant characteristics detected by the formant detection means are changed; and

a modulator for modulating a level of a signal of each of the frequency bands based on the modulation level set in the level setter. (Emphasis added.)

At least for reasons similar to those presented with respect to independent claim 1, Applicant respectfully submits that independent claim 38 is patentable over the cited references.

At least because claim 39 depends from claim 38, Applicant respectfully submits that this dependent claim is patentable over the cited references.

New Claims

New claims 49 and 50 depend from claim 4, which depends from claim 1. At least for this reason, it is believed that these claims are patentable over the cited art.

Further, new claim 49 recites: "wherein the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients" and "wherein the setting means sets the modulation levels, free of changing the filter coefficients." (Emphasis added.)

Support for these features can be found, for example, in paragraph [0059] on page 12 of Applicant's specification and Applicant's FIGs. 7(a) and 7(d).

As previously explained regarding claim 1, Gibson discloses certain methods of spectral modification that involve changing filter coefficients that define the frequency characteristics of the filter. As such, Gibson does not disclose or suggest "wherein the setting means sets the

modulation levels, free of changing the filter coefficients[,]" as recited in new claim 49. (Emphasis added.)

Further, Choi and Cano do not address the distinctions between claim 49 and Gibson.

As such, the features of new claim 49 further distinguish the claimed embodiment over the cited art.

Further, new claim 50 recites: "wherein the filter comprises a digital filter having frequency characteristics defined by a plurality of filter coefficients" and "wherein the setting means sets the modulation levels while the filter coefficients remain constant." (Emphasis added.)

Support for these features can be found, for example, in paragraph [0059] on page 12 of Applicant's specification and Applicant's FIGs. 7(a) and 7(d).

For reasons similar to those explained regarding new claim 49, the features of new claim 50 further distinguish the claimed embodiment over the cited art.

Concluding Remarks

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or

incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 7/13/09

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